REMARKS/ARGUMENTS

Applicants respectfully request the Examiner to reconsider and allow this entire application in view of the claim amendments and the following remarks.

Applicants appreciate the Examiner's indication that claims 9, 10, 22, 23 and 28-31 recite allowable subject matter and would be allowed if rewritten into independent form including all of the limitations of their base claims and any intervening claims. Applicants have rewritten these claims into independent form such that they should now be allowable.

The only remaining issue outstanding is the rejection of claims 1, 3-14 and 16-34 allegedly being "anticipated" by newly-cited Blanz, "A Morphable Model for the Synthesis of 3D Faces." Applicant respectfully submits that the Examiner has mis-interpreted the Blanz document – and that Blanz et al when properly understood does not teach or suggest applicant's claimed invention.

Blanz et al relates to a technique for modelling 3D faces using a so-called "morphable face model." See Abstract. Blanz states that the "morphable face model is a multidimensional 3D morphing function that is based on the linear combination of a large number of 3D face scans." Page 187. Blanz created this "morphable face model" by parameterizing laser scans of the heads of hundreds of different people. See page 188.

Blanz et al represents the geometry of a face with a "shape-vector" S which contains the X, Y, Z coordinates of the n vertices that make up the geometry of the face. Page 189. Blanz et al represent the texture of the face with a "texture-vector" T. Blanz is

quite clear that this "texture-vector" T is not the actual texture map corresponding to a texture-mapped face, but instead is a representation that contains the color component values of each of the n vertices the shape-vector represents:

> We therefore represent the texture of a face by a texture-vector $T = (R_1, G_1, B_1, R_2, ..., G_n, B_n)^T \in R^{3n}$, that contains the R, G, B color values of the n corresponding vertices.

Page 189.

To "morph" the resulting model into an individual face, Blanz et al compute wieghted sums ΔS and ΔT shown on page 190 left-hand column, top. Multiples of these values are added to or substracted from individual faces to obtain variations of the type shown for example in Figure 3 of the paper. The resulting facial representation is "matched" to facial images by computing "the full 3D shape of the current model, and 2D positions $(p_x, p_y)^T$ of all vertices" and then determining "a_k, and detects hidden surfaces and cast shadows in a two-pass z-buffer technique." See page 191, left-hand column near bottom. Thus, Blanz does not teach morphing a texture at all – he is really teaching a very sophisticated technique of morphing shape-and-texture-vectors to develop different three-dimensional representations. See Figure 3, Figure 5 and Figure 7 ("3D Reconstruction")..

In rejecting each of applicant's previously presented independent claims, the Examiner contends that Blanz teaches "pre-decomposing at least some texels of a texture map into respective texel color components." See Office Action. On the contrary, as explained above, what Blanz teaches is forming a texture-vector based on the color

components of the vertices that represent the geometry of the face obtained from laser scans. This texture-vector information is not texel color components of a pre-decomposed texture map as claimed.

Similarly, the Examiner contends that Blanz et al teach using a predetermined incremental morph parameter to incrementally interpolate by repetitively adding it to the predetermined texel color components to produce a corresponding sequence of intermediate states. Once again, Blanz et al do not teach this. To the extent the ΔT value can be characterized as a "predetermined incremental morph parameter", it is not added to or substracted from texel color components but instead is applied to texture-vector RGB values representing vertex colors.

It should be evident from looking at Blanz et al's Figure 2 that his approach is fundamentally different from applicant's. Blanz provides a very sophisticated approach in which the geometry (shape) and corresponding geometry-defining vertex colors are "morphed" to provide a wide variety of 3D face representations. Applicant's texture morphing approach is incapable of morphing geometry. Furthermore, it seems unlikely that such a sophisticated process could be performed in real time on a limited capability computing platform such as a home video game system.

In contrast, applicant's disclosed exemplary illustrative implementation is able to provide a kind of "texture morphing" based on interpolating 2D texture map color components through repetitively incrementing (or decrementing) texel color component values. Note that Blanz et al's approach does not provide any morphing of minute facial

features such as freckles, birthmarks or wrinkles that would typically be represented by conventional texture maps. In contrast, applicant's technique could "morph" such features. Applicant's approach is not taught or suggested by Blanz.

The Examiner's further statements concerning Blanz et al are also not entirely on the mark. For example, Blanz et al's teaching to use "data reduction applied to the shape and texture data" is not the same technique required by applicant's claim 6 of conditioning incremental interpolation on which of successive time periods has occurred or the technique required by applicant's claim 11 using a frame counter. Similarly, Blanz et al's teaching of extending his database by using fast optical digitizers to dynamically scan face data is not the same as interpolating during successive frame times as recited in applicant's claim 5 (In fact, it is not at all clear that Blanz et al is able to perform real time imaging as recited in applicant's claim). With respect to claims 7 and 8 requiring integer arithmetic, applicant questions where this teaching is shown in Blanz. With respect to applicant's claim 12, applicant once again emphasizes that Blanz et al's texture-vector is not a predecomposed texture map as applicant has claimed but rather is a special construct containing the color components of the vertices of the shape-vector. With respect to applicant's claim 13 requiring an alpha value, applicant can find no teachings or suggestions in Blanz to interpolate transparency.

All outstanding issues have been addressed, and the application is now in condition for allowance. Should any minor issues remain outstanding, applicants encourage the

Examiner to contact the undersigned at the telephone number listed below so that all such issues can be resolved as expeditiously as possible.

Respectfully submitted,

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